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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,096	11/26/2003	Takafumi Nakamori	65933-059	6180

7590 . 11/02/2004

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EXAMINER	
YOUNG, BRIAN K	

ART UNIT	PAPER NUMBER
2819	

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,096	NAKAMORI ET AL.	
	Examiner	Art Unit	
	Brian Young	2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14 and 16-20* is/are allowed.

6)☒ Claim(s) *1-13,15 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/26/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-13,15 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinomiya et al.

Shinomiya et al disclose a radio-frequency power amplifier of mobile communication equipment including a differential amplifier arranged to balanced-input and amplify a radio-frequency signal delivered from a frequency converter of a transmission system of the mobile communication equipment located downstream of a modulator of the transmission system. The radio-frequency signal delivered from the differential amplifier is further amplified and balanced-output by a push-pull circuit. The differential amplifier and the push-pull circuit are respectively ***supplied with bias currents varying in dependence on a gain control signal***, whereby respective amplification gains of the differential amplifier and the push-pull circuit are variably adjusted.
With reference to FIG. 2, the RF power amplifier will be explained in detail.
The RF power amplifier 206 is configured in the form of a monolithic integrated circuit (hereinafter referred to as RF power module 206. With reference to FIG. 1, the RF power module 206 is mounted on a circuit board 2a together with circuit component parts which cooperate with the RF power module 206 to constitute the transmitter section 2t and circuit component parts constituting the receiver section 2r, whereby the radio-frequency section 2 is configured in the module form, i.e., the radio-frequency module 2. The RF power module 206 serves to amplify, with a desired gain (e.g., 5 dB, 10 dB or 30 dB), a radio-frequency signal of, e.g., 2 GHz modulated at the QPSK modulator (more generally, RF modulator) 201 and to output the amplified radio-frequency signal to the ***antenna 1***.

As shown in FIG. 2, the RF power module 206 comprises an input stage which is comprised of first and second differential amplifiers 11 and 12 coupled directly to each other. The first differential amplifier 11 has its input terminals respectively connected to RF balanced-input terminals (RFin(+), RFin(-)) 206a and 206b of the module 206, to thereby balanced-input the radio-frequency signal. The RF power module 206 further comprises an output stage which is comprised of a push-pull circuit 13 having input terminals thereof connected to output terminals of the second differential amplifier 12 and output terminals thereof connected to RF balanced-output terminals (RFout(+), RFout(-)) 206c and 206d of the module 206, respectively. The push-pull circuit 13 is arranged to power-amplify the radio-frequency signal amplified in the differential amplifiers 11 and 12 and to balanced-output the amplified radio-frequency signal to the antenna 1.

First and second bias current circuits *15* and 16 connected to the first and second differential amplifiers 11 and 12, respectively, are supplied with *an internal reference voltage Vref for their operations from a reference voltage generator 19*. Each of the bias current circuits *15* and 16 varies a bias current supplied to a corresponding one of the differential amplifiers 11 and 12 in accordance with a gain control signal supplied from the base station 100 or the main control circuit 4, to thereby variably set the amplification gain of the corresponding differential amplifier. A third bias current circuit 17 connected to the push-pull circuit 13 varies a bias current supplied to the push-pull circuit 13 in accordance with the gain control signal, to thereby set an optimum DC bias current permitting the portable telephone to generate the transmission output of a desired level, while preventing a large electric power loss in the push-pull circuit 13.

The amplification gain with respect to the radio-frequency signal in each differential amplifier and in the push-pull circuit is set in the order of, e.g., 10 dB. The gain control of 20 dB for variable adjustment of the radio-frequency signal output (transmission output)

is carried out by variably changing the bias current supplied to the differential amplifier 11 provided at the first stage of the RF power module 206.

In FIG. 2, reference numeral 206e denotes a gain control signal input terminal of the RF power module 206, reference numeral 207 denotes a tuning circuit, and symbol GND denotes a grounding pattern which is formed in the circuit board 2a
More specifically, as shown in FIG. 3, the RF power module 206 is mainly comprised of bipolar transistors T1, T2, . . . , T11. The first differential amplifier 11 of the RF power module is mainly comprised of a pair of transistors T1 and T2 having emitters thereof connected to each other and their collectors to which loading resistors R1 and R2 are connected, respectively. The first differential amplifier 11 constituted by the transistors T1 and T2 is driven by a constant current source constituted by a transistor T3 provided between the emitters of these transistors and the grounding (GND), and amplifies the radio-frequency signal which is balanced-input at the bases of the transistors Ti and T2 through capacitors.

The second differential amplifier 12 is mainly comprised of a pair of transistors T4 and T5 having emitters thereof connected to each other and bases thereof directly connected to the collectors of the transistors T1 and T2, respectively. The second differential amplifier 12 constituted by the transistors T4 and T5 is driven by a constant current source constituted by a transistor T6 provided between the emitters of these transistors and the grounding (GND), and balanced-amplifies the radio-frequency signal. That is, the second differential amplifier 12 amplifies the radio-frequency signal amplified in the first differential amplifier 11 and then applied to the bases of the transistors T4 and T5.

The constant current sources respectively comprised of the transistors T3 and T6 serve to vary the bias currents for the first and second differential amplifiers 11 and 12 in accordance with the gain control signal under the control of the bias current circuits *15*

and 16, to thereby variably set the amplification gains of the differential amplifiers 11 and 12. This variable bias current control makes it possible to set amplification gains of the differential amplifiers 11 and 12 which meet the radio-frequency signal level and to perform the automatic gain control (AGC) for the radio-frequency signal.

Meanwhile, the bias current circuits *15* and 16 may be configured so as to control the operations of the transistors T3 and T6 in accordance with ambient temperature, to thereby achieve a temperature compensating function for the differential amplifiers 11 and 12.

The push-pull circuit 13 is mainly comprised of a pair of transistors T7 and T8 having emitters thereof both connected to the grounding and bases thereof respectively connected through capacitors to the collectors of the transistors T4 and T5 constituting the second differential amplifier 12. Thus, the push-pull circuit 13 balanced-inputs and amplifies the radio-frequency signal amplified in the differential amplifier 12, to thereby obtain its amplified output between the collectors of the transistors T7 and T8.

A pair of driving transistors T9 and T10 are provided between the bases of the transistors T7 and T8. These driving transistors T9 and T10 determine the base currents of the transistors T7 and T8, respectively, and hence determine the bias current for the push-pull circuit 13. Each of the driving transistors T9 and T10 is driven by the third bias current circuit 17 through a transistor T11 so as to cause a constant current to flow through the driving transistors. Under the control of the bias current circuit 17, these driving transistors T9 and T10 vary the base currents of the transistors T7 and T8, to thereby optimize the DC bias current for the push-pull circuit 13.

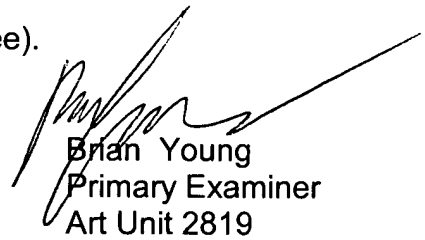
3. Claims 14 and 16-20 are allowed.

4. Upon further consideration, the indicated allowability of claim 15, is withdrawn.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Young whose telephone number is 571-272-1816. The examiner can normally be reached on Mon-Fri 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Tokar can be reached on 571-272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Brian Young
Primary Examiner
Art Unit 2819

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